Claims 4-7, 9, 10 and 12 were rejected under 35 USC 102(b) as being anticipated by Short. Applicant respectfully traverses this rejection.

Anticipation under Section 102 of the Patent Act requires that a prior art reference disclose every claim element of the claimed invention. See, e.g., Orthokinetics, Inc. v. Safety Travel Chairs, Inc., 806 F.2d 1565, 1574 (Fed. Cir. 1986). While other references may be used to interpret an allegedly anticipating reference, anticipation must be found in a single reference. See, e.g., Studiengesellschaft Kohle, G.m.b.H. v. Dart Indus., Inc., 726 F.2d 724, 726-27 (Fed. Cir. 1984). The absence of any element of the claim from the cited reference negates anticipation. See, e.g., Structural Rubber Prods. Co. v. Park Rubber Co., 749 F.2d 707, 715 (Fed. Cir. 1984). Anticipation is not shown even if the differences between the claims and the prior art reference are insubstantial and the missing elements could be supplied by the knowledge of one skilled in the art. See, e.g., Structural Rubber Prods., 749 F.2d at 716-17.

The basic idea of jet pumping (of which the Short patent is a variant) is the use of a high pressure fluid flow (driving fluid; usually water), impelling it through a nozzle where the potential energy (pressure) is transformed into kinetic energy. This pressure drop occurs in the throat (the central part) of a venturi and the fluid from the oil well is "sucked" up through the venturi. There is a mixture of the two flowing fluids (the power fluid and the produced fluid) in the throat and after it there is a diffuser that allows a partial pressure recovery that is sufficient to carry the fluids up to surface.

The physical principle of jet pumping is completely different from gas lift, to which the invention relates. In gas lift, high pressure gas enters into the pipe (production tubing) at a certain point of injection, producing a reduction of the fluid density. The gas lift method is similar to the natural flowing production process, in which the energy for the well production is supplied by the reservoir itself. Thus, gas

lift is used as a supplement, to provide the gas flow needed for production that is not available from the reservoir, in order to produce oil from a well at a desirable flow rate.

The gas admission for gas lift can be achieved by drilling a single hole in the tubing or by another more sophisticated device, such as a gas lift valve. In accordance with applicant's invention, the round orifice in a conventional gas lift valve is replaced with a venturi, reducing the localized head loss and allowing the injection of large gas flow rates even with very small pressure differentials between the annulus and the tubing. It should be noted, therefore, that the gas pressure in the annulus at the injection point does not need to be much bigger than the flowing pressure in the tube, being only enough to perform the required gas flow rate injection. The lift valve with venturi disclosed and claimed by applicant reduces this difference to a minimum value.

For jet pumping, the energy for recovering the production fluid is supplied by a driving fluid (usually water or oil) at a very high pressure. The idea is based on the energy conservation law expressed by Bernoulli's equation:

$$p_1 + \frac{1}{2}\rho v_1^2 + \rho g h_1 = p_2 + \frac{1}{2}\rho v_2^2 + \rho g h_2$$

If $h_1=h_2$, if $v_2 > v_1$, then $p_2 < p_1$. Thus, having a fluid with high pressure, it can be accelerated in an ejector nozzle, thereby reducing its pressure. In broad terms, "pressure energy" is converted into "kinetic energy". If the pressure at the nozzle outlet is sufficiently small there will be a fluid flow from the reservoir up to the nozzle region. Downstream of the ejector, a diffuser is installed that has the function of decelerating the flow. Thus, in accordance with Bernoulli's equation, the "kinetic energy" is converted back into "pressure energy" again. The pressure at the diffuser outlet is adapted to be sufficient to promote the fluid flow (reservoir fluid plus driving fluid) up to the surface.

Thus, the differences between gas lift and jet pumping are clear and well understood in the art. In the first, one supplements gas that should exist in the reservoir if the well was producing from natural flow at the specified flow rate. In the second, one supplies energy directly to the fluid flow, such as using a positive displacement pump. An additional significant difference is that when using gas lift, the well fluid never flows through the gas lift valve.

Short has disclosed a jet pumping system that uses gas as the driving fluid. The gas passes through an ejector in order to convert pressure into velocity and is flowed by the pressure recovered at the diffuser. There is a benefit in reducing the pressure at the pump outlet due to the low density gas that mixes with the reservoir fluid (contrary to the traditional driving fluids that have high density), but the low density of the gas implies a poor conversion of the kinetic energy into pressure energy in the jet pump (see in the Bernoulli equation the presence of specific density in the kinetic term). Consequently, it is necessary to have a very large gas flow rate and pressure to compensate for the pressure loss in the ejector nozzle.

In the Examiner's Official Action of September 8, 2003, the Examiner starts with "Given the broadest reasonable interpretation of the claims of the instant invention, the gas injection element (64) of Short is readable as a 'gas lift valve'..." Thus, the Examiner infers that since gas passes through a venturi in Short, Short´s patent can be used against applicant's claims. It is respectfully submitted, however, that in attempting to read Short on the claimed invention, the Examiner has overlooked the specific limitations of, e.g., claim 4 and has inconsistently characterized the component parts of Short. In the event the Examiner believes that gas injection element 64 is readable as a gas lift valve, then the Examiner should be comparing the gas lift valve as recited within, e.g., claim 4 with the gas injection element 64. Rather than doing this, however, after characterizing element 64 as a gas lift valve, the Examiner then tries to include by extension the venturi that exist downstream of element 64. However, these two discrete and spaced parts do not meet the limitations of applicant's claim 4. In this

regard the Examiner is reminded that claim 4 states that the apparatus for controlling gas lift comprises "a gas lift valve" mounted on said tubing and having an inlet end and an outlet, "said gas lift valve consisting of a housing and a nozzle mounted in said housing," the nozzle having an open passage consisting of the curved inlet portion, straight intermediate portion and outwardly tapered, conical outlet portion (Emphasis added). The Short reference identified by the Examiner does not teach or suggest a gas lift valve mounted on tubing concentrically disposed in a casing of an oil well, the gas lift valve consisting of a housing and a nozzle having an open passage configured as claimed. If the Examiner considers component 64 to be the claimed gas lift valve, the Examiner has not identified the claimed housing and nozzle; venturi 46 is not a part of the component 64 identified by the Examiner and component 64 is not mounted on the tubing, as claimed, nor does it consist of a housing and a nozzle, as claimed. Indeed, component 64 is disposed within tube 54, not on it, and does not consist of a housing and venturi meeting the limitations of applicant's claim. The separate component 46 does not overcome this deficiency of Examiner's characterization of Short. This is a material difference between Short and the invention claimed because, in the invention, the same fluid (gas) flows through the gas lift valve and the venturi, because the venturi is disposed within the gas lift valve. In the case of jet pumping, as in Short, even if gas is injected through component 64, both that gas and the reservoir fluids flow through the venturi. In other words, what flows through the venturi in all examples of the Short patent is a mixture of reservoir fluids and the injection gas. The attached Figure clearly shows this difference by way of demonstration. The relevance here is that it is clear that in Short the venturi and the gas injection element ("gas lift valve" according to the Examiner") are separate and distinct components because different media flows through each.

There would be a superficial similarity between the claimed invention and Short's gas injection element only if there were a venturi as claimed by applicant within the gas injection element, but this is not the case. Even if someone were aware of Short's

disclosure, the invention concept would not be anticipated nor obvious because Short's gas injection element resembles a conventional orifice gas lift valve and not the configured venturi passage claimed by applicant. In any event, a venturi inside gas injection element 64 would not make sense because it would introduce a head loss (loss of pressure) before the ejector nozzle. The Examiner's next statement that "a high velocity jet of gas" is directed through the venturi member also, with respect, does not make sense since , according to the invention claimed, there is not a gas jet which is introduced into the venturi and, as seen in Figure 1, in jet pumping, what passes through the venturi is not a gas jet but a mixture of all the fluids, something that does not in any event occur in a gas lift valve.

In the next paragraph, the Examiner says that "Applicant has previously argued that on page 12 of the amendment filed May 8, 2001 [sic; April 30, 2001] ... that the Short reference did not anticipate the rejected claim 4 because Short´s structure 'is not disposed for production fluid therethrough'...". However, the Examiner has distorted what was said by applicant's counsel. It can be seen on page 12, that precisely the opposite was said: "Short´s structure is disposed in the production tubing to suck the production fluid with the driving fluid therethrough, whereas a gas lift valve is disposed to connect the annulus to the production tubing, to flow gas into the production fluid, but is not disposed for production fluid flow therethrough." The claims of the application do not specifically state that the production fluid may not pass through the venturi simply because that is implicit by virtue of its inclusion as a part of the gas lift valve structure and is a characteristic well known and understood from "gas lift", which is a term of art. Contrary to what the examiner states, in the Short patent, the "injected gas" does not pass through the venturi. The fluid that flows through the venturi is the mixture of the injection gas and the fluids from the reservoir. The injected gas at that time is not identifiable any more; it is a mere component of the mixture produced by the well. The function of the gas injection element in the Short patent is exhausted in the moment when the gas enters the gas jet element and the function of

the latter is exhausted when forming the jet which sucks the reservoir fluids as shown in the attached figure.

In the present invention, the injected gas flows in an isolated, identifiable way through the venturi with the aim of controlling the throughput (flow rate) with the least possible loss of pressure (head loss). The function of applicant's "gas injection element" (gas lift valve) is only exhausted after the passage of the gas through the venturi and through the check valve in an individualized way.

In regard to claim 5, the component 64 identified by the Examiner does not constitute a structure "mounted on said tubing". Unit 64 is mounted within the interior of a tube. Furthermore, the outlet of the gas lift valve, comprised of the housing and the nozzle mounted within the housing, is claimed as being for discharging gas into the tubing whereas in Short, only the outlet of component 64 is for discharging gas, whereas the outlet of the venture structure does not discharge anything additional into the tubing because everything it discharges was already in the tubing. Further, the flow out of the venturi is the mixture of gas and production fluid. It is respectfully submitted that not only would the skilled artisan immediately recognize that Short does not teach or suggest what would be understood in the art to be a gas lift valve, but Short does not in any event meet the limitations of applicant's claim 5.

Claim 7 is likewise is submitted to be patentable over Short. Claim 7 is specifically directed to a gas lift system which is a known and well understood type of system for injecting pressurized gas into a well having a production string. Further in regard to claim 7, in the event component 64 is considered to be the gas lift valve, it is clear that element 64 does not read on claim 7. Indeed, the Examiner has not identified in Short a housing having an inlet port for pressurized gas, the gas flowing through a continuous flow path configured as claimed and out through the outlet portion into a production string. In Short, the gas injector is disposed in line and independent of the venturi, so that there is no teaching of a housing having an inlet, a

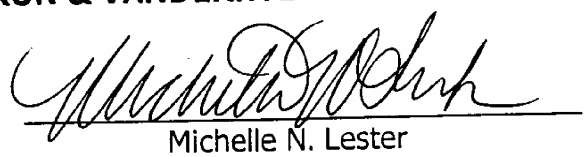
flow path as defined in claim 7, and an outlet port into the production string. Indeed, there is no continuous flow path in Short and no outlet for flow into a production string, because the Short components are already in the production string.

For all the reasons advanced above, reconsideration and withdrawal of the rejection based on Short is required.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance and an early Notice to that effect is earnestly solicited.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 
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